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OFFICE OF
PREVENTION, PESTICIDES, AND
TOXIC SUBSTANCES

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MEMORANDUM

SUBJECT: Tier I Estimated Environmental Concentrations for Thiophanate-methyl (PC Code:102001) and Its Major Degradate, MBC (PC Code:128872), for Application on Turf

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Summary

This memo presents the Tier I Estimated Environmental Concentrations (EECs) for thiophanate-methyl and its major degradate, MBC (methyl 2-benzimidazolylcarbamate or carbendazim), based on a maximum application rate of 76.6 lb a.i./A on turf. The models, GENEEC and SCIGROW, were used for estimating EECs in surface water and groundwater, respectively. The results are:

Chemical	<u>Surface Water (ug/L)</u>		<u>Groundwater (ug/L)</u>
	Acute	Chronic	
Thiophanate-methyl (parent)	2100	1100	0.17
MBC (degradate)	1600	730	15

1.0 ESTIMATION OF SURFACE WATER AND GROUNDWATER EXPOSURE CONCENTRATIONS

The input parameter for the maximum application rate associated with MBC was calculated from the thiophanate-methyl's application rate (76.6 lbs. a.i./A), stoichiometric conversion factor of thiophanate-methyl to MBC (mass conversion ratio or molecular weight ratio of MBC to thiophanate-methyl = 0.56), and conversion efficiency fraction (0.872) from soil aerobic metabolism (a dominant dissipation route). Using these values, the application rate for MBC was calculated to be $(76.6)(0.56)(0.872)$ or 35.5 lb a.i./A. The estimated application rate for MBC and the given application rate of thiophante-methyl were used in the two screening models GENEEC and SCIGROW for EECs in surface water and groundwater, respectively.

2.0 Background Information on GENEEC:

GENEEC is a screening model designed to estimate the pesticide concentrations found in water for use in ecological risk assessments. As such, it provides high-end values on the concentrations that might be found in ecologically sensitive environments due to the use of pesticide. GENEEC is a single-event model (one run-off event), but can account for spray drift from multiple applications. GENEEC is hardwired to represent a 10-ha field immediately adjacent to a 1-ha pond, 2 meters deep, with no outlet. The pond receives a spray drift event from each application plus one runoff event. The runoff event moves a maximum of 10% of the applied pesticide into the pond. This amount can be reduced due to degradation on field and the effect of binding to soil. Spray drift is equal to 1% of the applied concentration from the ground spray application and 5% for aerial applications.

Though GENEEC was not originally designed for use in drinking water risk assessments, it does provide a reasonable upper-bound estimate for screening purposes. Surface-water source drinking water tends to come from bodies of water that are substantially larger than a 1-ha pond. Furthermore, GENEEC assumes that essentially the entire basin receives an application of the chemical. In virtually all cases, basins large enough to support a drinking water utility will contain a substantial fraction of area that does not receive the chemical. Additionally, there is always some flow (in a river) or turnover (in a lake or reservoir) of the water so that the persistence of the chemicals near the drinking water utility intakes will be overestimated. Given all these factors, GENEEC does provide an upper-bound estimate of the concentration of a pesticide that could be found at the drinking water utility and therefore can be appropriately used in screening calculations. If a risk assessment performed using GENEEC output does not exceed the level of concern, then one can be reasonably confident that the actual risk will not be exceeded. However, because GENEEC can substantially overestimate true drinking water concentrations, it will be necessary to refine the GENEEC estimates if the level of concern is exceeded.

3.0 Background Information on SCI-GROW:

SCIGROW provides a groundwater screening exposure value to be used in determining the potential risk to human health from drinking water contaminated with the pesticide. Since the SCI-GROW concentrations are likely to be approached in only a very small percentage of drinking water sources, i.e., highly vulnerable aquifers, it is not appropriate to use SCI-GROW for national or regional exposure estimates.

SCI-GROW estimates likely groundwater concentrations if the pesticide is used at the maximum allowable rate in areas where groundwater is exceptionally vulnerable to contamination. In most cases, a large majority of the use area will have groundwater that is less vulnerable to contamination than the areas used to derive the SCIGROW estimate.

4.0 Modeling Inputs and Results:

Tables 1 and 2 summarize the input values used in the model runs for GENEEC and SCIGROW, respectively. The modeling results are presented in Table 3. Attached to this memo are copies of the printouts generated from the GENEEC and SCIGROW runs.

Table 1. Environmental Fate Input Parameters for Thiophanate-methyl and MBC in GENEEC.

Parameter	Thiophante-methyl (TM)	MBC	Source Thiophanate-methyl / MBC
PC Code	102001	128872	EFED Files
Water Solubility (ppm)	21.8	8	Product Chemistry
Hydrolysis Half-Life (pH 7) (days)	36	0 (stable)	MRID 40095507/Acc.# 00151418
Aerobic Soil Metabolism Half-Life (days)	1	320	MRID 106085/MRID 41255801
Aerobic Aquatic Metabolism Half-life (days)	0 (stable)	61	MRID 40061501/MRID 41137701
Photolysis Half-Life at pH 7 (days)	2.48	0 (stable)	MRID 41482806/Acc.# 00151419
Organic Carbon Adsorption Coefficient (K _{OC})	314 (Avg.)	1885(Avg.)	MRID 42351001/Acc.# 00151422

Table 2. Environmental Fate Input Parameters for Thiophanate-methyl and MBC in SCIGROW.

Parameter	Thiophanate-methyl (TM)	MBC	Source Thiophanate-methyl / MBC
Organic Carbon Partition Coefficient (K_{OC})	314 (Avg.)	1885 (Avg.)	MRID 42351001/ Acc.# 00151422
Aerobic Soil Metabolism Half-Life (days)	1	320	MRID 106085 / MRID 41255801

Table 3. Application information and Modeling Results for **Thiophanate-methyl** and **MBC** on turf

Parameter	Thiophanate-methyl	MBC	Source
Application Method	Ground	Ground	Product Label
Application Rate (lb ai/A)	76.6	35.5	Product Label
Application Frequency	6	6	Product Label
Application Interval (days)	14	14	Product Label
GENEEC Peak EEC (ppb)	2100	1600	Model Output
GENEEC 56-Day EEC (ppb)	1100	730	Model Output
SCIGROW Ground Water Concentration (ppb)	0.17	15	Model Output

GENEEC Run for Thiophanate-methyl on Turf

RUN No.	1 FOR Thiophanate-methyl	INPUT VALUES
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RATE (#/AC) ONE(MULT)	APPLICATIONS NO.-INTERVAL	SOIL KOC
76.600(76.605)	6 14	314.0
		SOLUBILITY (PPM)
		21.8
		% SPRAY DRIFT
		1.0
		INCORP DEPTH(IN)
		.0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
1.00	0	36.00	2.48-	304.30	.00
					32.19

GENERIC EECs (IN PPM)

PEAK GEEC	AVERAGE 4 DAY GEEC	AVERAGE 21 DAY GEEC	AVERAGE 56 DAY GEEC
2.13	2.04	1.64	1.12

SCI-GROW Run for Thiophanate-methyl on Turf

RUN No.	1 FOR thiophanate-methyl	INPUT VALUES
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APPL (#/AC) RATE	APPL. URATE NO. (#/AC/YR)	SOIL KOC
76.600	6 459.600	314.0
		SOIL AEROBIC METABOLISM (DAYS)
		1.0
<hr/>		
GROUND-WATER SCREENING CONCENTRATIONS IN PPB		
<hr/>		
.170962		
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A=	.167	B= 319.000
F=	-3.429	G= .000
	C= -.778	D= 2.504
	URATE= 459.600	GWSC=
		RILP= -1.948
		.170962

GENEEC Run for MBC (from Thiophante-methyl) on Turf

RUN No. 2 FOR MBC		INPUT VALUES				
RATE (#/AC) ONE(MULT)		APPLICATIONS NO.-INTERVAL		SOIL KOC	SOLUBILITY (PPM)	% SPRAY INCORP DRIFT DEPTH(IN)
35.500(197.714)		6	14	1885.0	8.0	1.0 .0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
320.00	0	N/A	.00-	.00	61.00 61.00

GENERIC EECs (IN PPM)

PEAK GEEC	AVERAGE 4 DAY GEEC	AVERAGE 21 DAY GEEC	AVERAGE 56 DAY GEEC
1.61	1.52	1.12	.73

SCI-GROW Run for MBC (from Thiophanate-methyl) on Turf

RUN No. 2 FOR MBC		INPUT VALUES		
APPL (#/AC) RATE	APPL. URATE NO. (#/AC/YR)	SOIL KOC	SOIL METABOLISM	AEROBIC (DAYS)
35.500	6 213.000	1885.0	320.0	

GROUND-WATER SCREENING CONCENTRATIONS IN PPB

15.489230					
A= 315.000	B= 1890.000	C= 2.498	D= 3.276	RILP= 1.808	
F= -1.138	G= .073	URATE= 213.000	GWSC= 15.489230		